AMENDMENTS TO THE CLAIMS

Claims 1-36 (Canceled)

37. (Previously Presented) An antenna comprising:

an element; and wherein

the element is formed from conductor patterns on a plurality of layers including at least one buried layer of a multilayer PCB, and the conductor patterns are in stacked relation and interconnected through the PCB.

38. (Previously Presented) An antenna according to claim 37, wherein the PCB is apertured adjacent to the element.

39. (Previously Presented) An antenna according to claim 37, including an antenna ground plane comprising a plurality of vias connecting ground plane regions on respective PCB layers.

40. (Previously Presented) An antenna according to claim 39, wherein the PCB is apertured adjacent to the element.

41. (Previously Presented) An antenna in accordance with claim 37 wherein interconnection of the conductor patterns is from the conductor patterns through the at least one buried layer.

42. (Previously Presented) An antenna in accordance with claim 41 wherein the interconnection is by vias extending through the at least one buried layer of the PCB.

43. (Previously Presented) A mobile phone including an antenna comprising an element formed from conductor patterns on a plurality of layers including at least

one buried layer of a multilayer PCB, wherein the conductor patterns are in stacked relation and interconnected through the PCB.

44. (Previously Presented) A mobile phone according to claim 43, wherein the PCB is apertured adjacent to the element.

45. (Previously Presented) A mobile phone according to claim 43, including an antenna ground plane comprising a plurality of vias connecting ground plane regions on respective PCB layers.

46. (Previously Presented) A mobile phone according to claim 45, wherein the PCB is apertured adjacent to the element.

47. (Previously Presented) A mobile phone in accordance with claim 43 wherein interconnection of the conductor patterns is from the conductor patterns through the at least one buried layer.

48. (Previously Presented) A mobile phone in accordance with claim 47 wherein the interconnection is by vias extending through the at least one buried layer of the PCB.

49. (New) An antenna structure, comprising:

a substrate having a footprint;

an antenna trace having a perimeter formed on a face of said substrate proximate a ground plane of said substrate and said perimeter being substantially co-planar with said face, wherein said substrate has a predetermined radio frequency loss associated therewith; and

a low-loss region extending through said substrate, wherein said low-loss region is an opening located within said footprint that extends transverse to and intersects a plane of said face, and said low-loss region located between said antenna trace and said ground plane, wherein said low-loss region has a radio frequency loss less than said radio frequency loss associated with said substrate, and wherein said low-loss region is located outside of said perimeter of said antenna trace.

50. (New) The antenna structure recited in claim 49 further including a plurality of said low-loss regions.

51. (New) The antenna structure recited in claim 50 wherein each of said low-loss regions is separated by a portion of said substrate.

52. (New) The antenna structure recited in claim 49 wherein said low-loss region comprises air.

53. (New) The antenna structure recited in claim 49 wherein said antenna trace includes antenna traces located on opposing surfaces of said substrate and connected by a via.

54. (New) The antenna structure recited in claim 49 wherein said substrate is comprised of a high loss material.

55. (New) A method of manufacturing an antenna structure, comprising:

forming an antenna trace having a perimeter formed on a face of a substrate having a footprint proximate a ground plane of said substrate and said perimeter

being substantially co-planar with said face, wherein said substrate has a predetermined radio frequency loss associated therewith; and

creating a low-loss region extending through said substrate and located between said antenna trace and said ground plane, wherein said low-loss region is an opening located within said footprint that extends transverse to and intersects a plane of said face, and wherein said low-loss region has a radio frequency loss less than said radio frequency loss associated with said substrate, and wherein said low-loss region is located outside said perimeter of said antenna trace.

56. (New) The method recited in claim 55 wherein said creating includes creating a plurality of low-loss regions.

57. (New) The method recited in claim 55 wherein said creating includes creating a plurality of low-loss regions separated by a portion of said substrate.

58. (New) The method recited in claim 55 wherein said substrate is comprised of a high-loss material.

59. (New) The method recited in claim 55 wherein said creating includes creating a low-loss region comprising air.

60. (New) The method recited in claim 55 wherein said forming includes forming antenna traces located on opposing surfaces of said substrate interconnected by a via extending through said substrate.

61. (New) A printed circuit board (PCB), comprising:

a substrate having a footprint and a ground plane and conductive traces formed thereon, wherein said substrate has a predetermined radio frequency loss associated therewith; and

an antenna structure, including:

an antenna trace having a perimeter formed on a face of a substrate proximate a ground plane of said substrate and said perimeter being substantially co-planar with said face, wherein said substrate has a predetermined radio frequency loss associated therewith; and

a low-loss region extending through said substrate and located between said antenna trace and said ground plane, wherein said low-loss region is an opening located within said footprint that extends transverse to and intersects said face, and wherein said low-loss region has a radio frequency loss less than said radio frequency loss associated with said substrate, and wherein said low-loss region is located outside said perimeter of said antenna trace.

62. (New) The PCB recited in claim 61 wherein said substrate is comprised of a high-loss material.

63. (New) The PCB recited in claim 61 wherein said low-loss region includes a plurality of low-loss regions separated by a portion of said substrate.

64. (New) The PCB recited in claim 61 wherein said substrate has a footprint, and said low-loss region is an opening located within a said footprint of said substrate.

65. (New) The PCB recited in claim 64 wherein said low-loss region includes a low-loss material comprising air.

66. (New) The PCB recited in claim 61 wherein said antenna trace includes antenna traces located on opposing surfaces of said substrate interconnected by a via extending through said substrate.

67. (New) An antenna structure, comprising:

an antenna trace formed on a substrate proximate a ground plane of said substrate, wherein said substrate has a footprint and a predetermined radio frequency loss associated therewith; and

a low-loss region extending through said substrate and located between said antenna trace and said ground plane, wherein said low-loss region is an opening located within said footprint that extends transverse to and intersects a plane of said face, and wherein said low-loss region has a radio frequency loss less than said radio frequency loss associated with said substrate, and said antenna trace does not overlap said low-loss region.

68. (New) An antenna structure, comprising:

a planar antenna trace formed on a substrate;

a ground plane formed on said substrate, wherein a plane of said substrate on which said planar antenna is located is co-planar or parallel with a plane of said substrate on which said ground plane is located, and said ground plane is non-overlapping with said planar antenna trace; and

an insulation region extending through said substrate and located between said planar antenna trace and said ground plane.

69. (New) The antenna structure recited in claim 68, wherein said planar antenna trace is a first planar antenna trace and said antenna structure further includes a second planar antenna trace located on an opposing, parallel surface of said substrate and said first and second planar antenna traces are interconnected by a via extending through said substrate.

70. (New) The antenna structure recited in claim 68 wherein said insulation region includes a plurality of insulation regions.

71. (New) The antenna structure recited in claim 70 wherein each of said insulation regions are separated by a portion of said substrate.

72. (New) The antenna structure recited in claim 68 wherein said insulation region is an opening that extends through said substrate and an insulator of said insulation region is air.

73. (New) The antenna structure recited in claim 68 wherein said substrate is a lossy substrate.

74. (New) A method of manufacturing an antenna structure, comprising:

forming planar antenna trace on a substrate;

forming a ground plane on said substrate, wherein a plane of said substrate on which said planar antenna is located is co-planar or parallel with a plane of said substrate on which said around plane is located, and said ground plane is non-overlapping with said planar antenna trace; and

creating an insulation region extending through said substrate and located between said planar antenna trace and said ground plane.

75. (New) The method recited in claim 74, wherein said planar antenna trace is a first planar antenna trace and said antenna structure further includes a second planar antenna trace located on an opposing, parallel surface of said substrate and said first and second planar antenna traces are interconnected by a via extending through said substrate.

76. (New) The method recited in claim 74, wherein said creating includes creating a plurality of insulation regions.

77. (New) The method recited in claim 74, wherein said creating a plurality of insulation regions includes creating a plurality of insulation regions separated by a portion of said substrate.

78. (New) The method recited in claim 74, wherein said creating an insulation region includes creating an opening that extends through said substrate and wherein an insulator of said insulation region is air.

79. (New) The method recited in claim 74, wherein said forming includes forming antenna traces located on opposing surfaces of said substrate interconnected by a via extending through said substrate.

80. (New) A printed circuit board (PCB), comprising,

a substrate having

a ground plane and conductive traces formed thereon; and

a planar antenna structure, including: an antenna trace formed on said substrate;

said planar ground plane formed on said substrate, wherein a plane of said substrate on which said planar antenna is located is co-planar or parallel with a plane of said substrate on which said ground plane is locate, and said ground plane is non-overlapping with said antenna trace; and

an insulation region extending through said substrate and located between said antenna trace and said ground plane.

81. (New) The PCB recited in claim 80, wherein said planar antenna trace is a first planar antenna trace and said antenna structure further includes a second planar antenna trace located on an opposing, parallel surface of said substrate and said first and second planar antenna traces are interconnected by a via extending through said substrate.

82. (New) The PCB recited in claim 80, further including electrical components mounted on said substrate and interconnected between at least one of said conductive traces and said ground plane to form an operative circuit.

83. (New) The PCB recited in claim 80, wherein said insulation region includes a plurality of insulation regions separated by a portion of said substrate.

84. (New) The PCB recited in claim 80, wherein said insulation region is an opening that extends through said substrate and an insulator of said insulation region is air.

85. (New) An antenna structure, comprising:

an antenna substrate having a planar surface, said antenna substrate having a predetermined radio frequency loss associated therewith;

a planar antenna trace formed on said planar surface and extending along and adjacent an edge of said planar surface;

a ground plane formed on said antenna substrate, wherein said ground plane is non-overlapping with said planar antenna trace; and

a low-loss region located between said planar antenna trace and said ground plane, said low-loss region having a longitudinal axis extending along only a portion of and adjacent said edge, and having a radio frequency loss less than said predetermined radio frequency loss.

86. (New) The antenna structure recited in claim 85, wherein said low-loss region is non-overlapping with said planar antenna trace.

87. (New) The antenna structure recited in claim 86, wherein said ground plane is a planar ground plane and is located on said planar surface and is co-planar with said planar antenna trace.

88. (New) The antenna structure recited in claim 85 further including a plurality of said low-loss regions, wherein each of said low-loss regions is separated by a portion of said substrate and each of said plurality is non-overlapping with said planar antenna trace.

89. (New) The antenna structure recited in claim 85 wherein said low-loss region comprises air.

90. (New) The antenna structure recited in claim 85 wherein said planar antenna trace comprises a first portion that extends in one direction along said edge and a second portion that extends in an opposite direction along said edge.

91. (New) The antenna structure recited in claim 85 wherein said low-loss region is an opening that extends through a thickness of said substrate.

92. (New) A method of manufacturing an antenna structure, comprising:

providing an antenna substrate having a planar surface, said antenna substrate having a predetermined radio frequency loss associated therewith,

forming a planar antenna trace on said planar surface along and adjacent an edge of said planar surface,

placing a ground plane on said antenna substrate, wherein said ground plane is non-overlapping with said planar antenna trace; and

creating a low-loss region between said planar antenna trace and said ground plane, said low-loss region having a longitudinal axis extending along only a portion of and adjacent said edge, said low-loss region having a radio frequency loss less than said predetermined radio frequency loss.

93. (New) The method recited in claim 92, wherein said low-loss region is non-overlapping with said planar antenna trace.

94. (New) The method recited in claim 92, wherein said ground plane is a planar ground plane formed on said planar surface and co-planar with said planer antenna trace.

95. (New) The method recited in claim 92 wherein said creating includes creating a plurality of low-loss regions, wherein each of said low-loss regions is separated by a portion of said substrate and each of said plurality is non-overlapping with said planar antenna trace.

96. (New) The method recited in claim 92 wherein said creating includes creating a low-loss region comprising air.

97. (New) The method recited in claim 92 wherein said forming includes forming first and second portions of said planar antenna trace where said first portion extends in one direction along said edge and the second portion extends in an opposite direction along said edge.

98. (New) The method recited in claim 92 wherein said creating said low-loss region comprises forming an opening that extends through a thickness of said substrate.